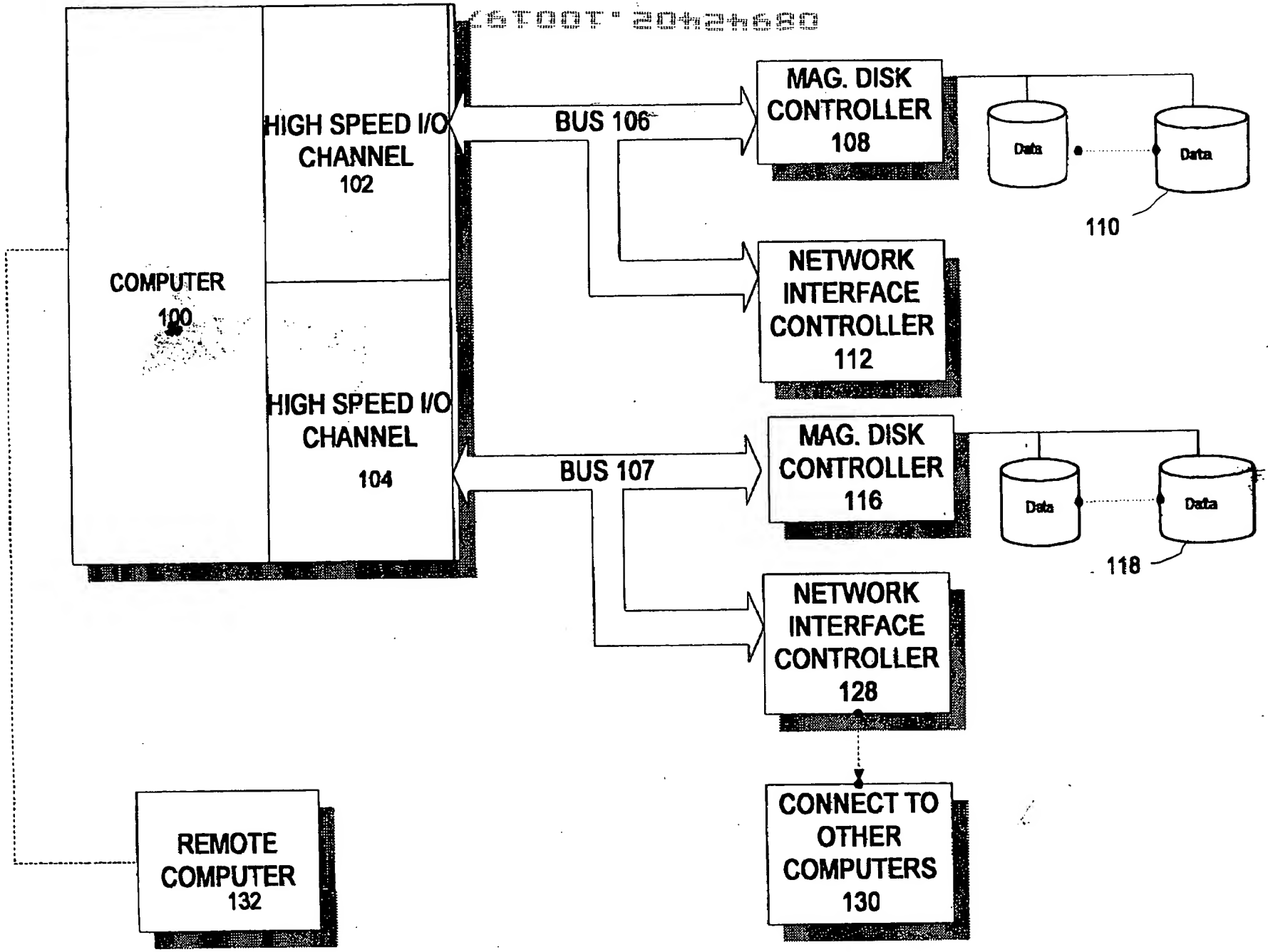
COMPUTER
100
HIGH SPEED I/O
CHANNEL
102
HIGH SPEED I/O
CHANNEL
104
BUS 106
BUS 107
MAG. DISK
CONTROLLER
108
NETWORK
INTERFACE
CONTROLLER
112
MAG. DISK
CONTROLLER
116
NETWORK
INTERFACE
CONTROLLER
128
Data
Data
110
Data
Data
118
REMOTE
COMPUTER
132
CONNECT TO
OTHER
COMPUTERS
130

FIG. 1

26TOOT" 20424680

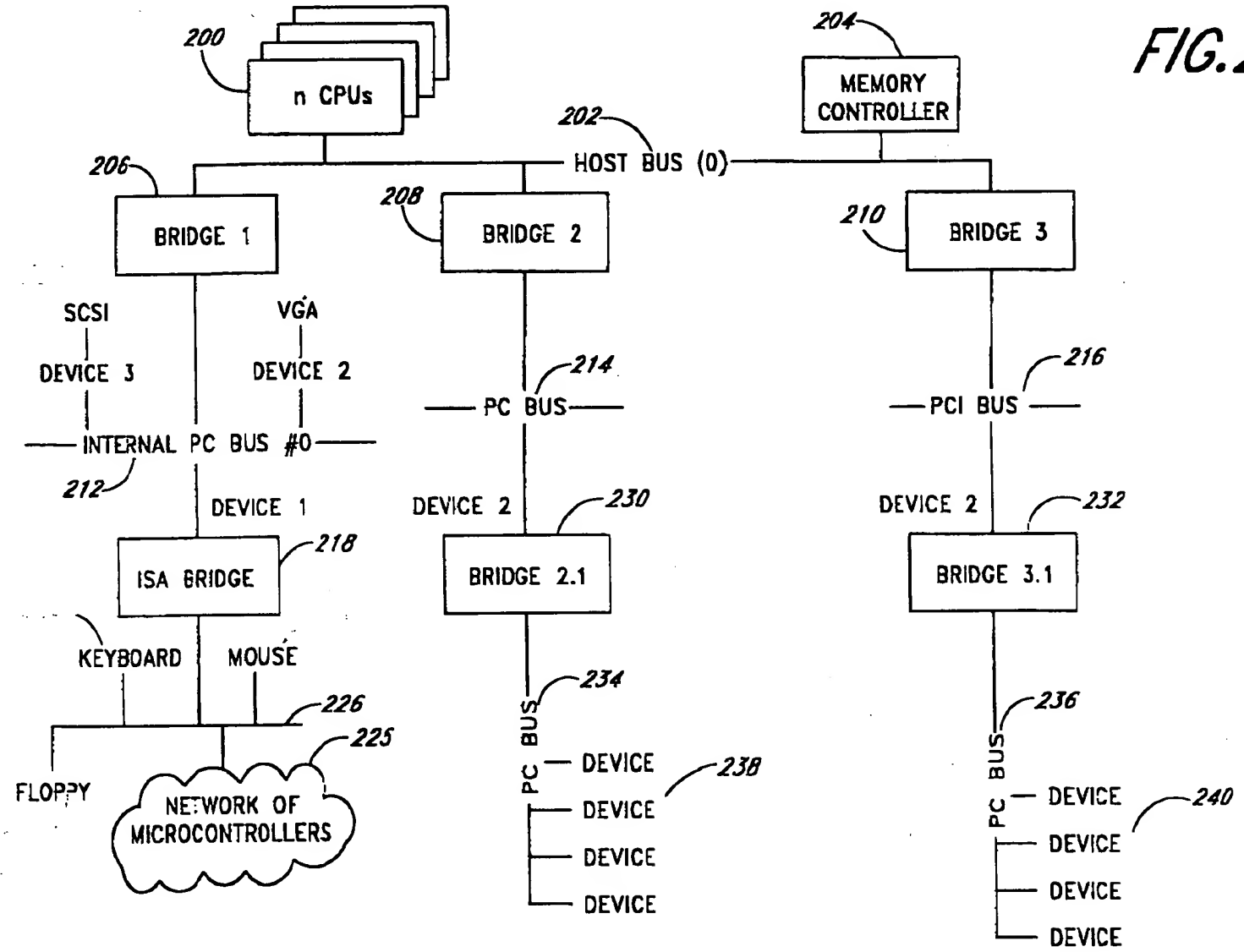

FIG.2

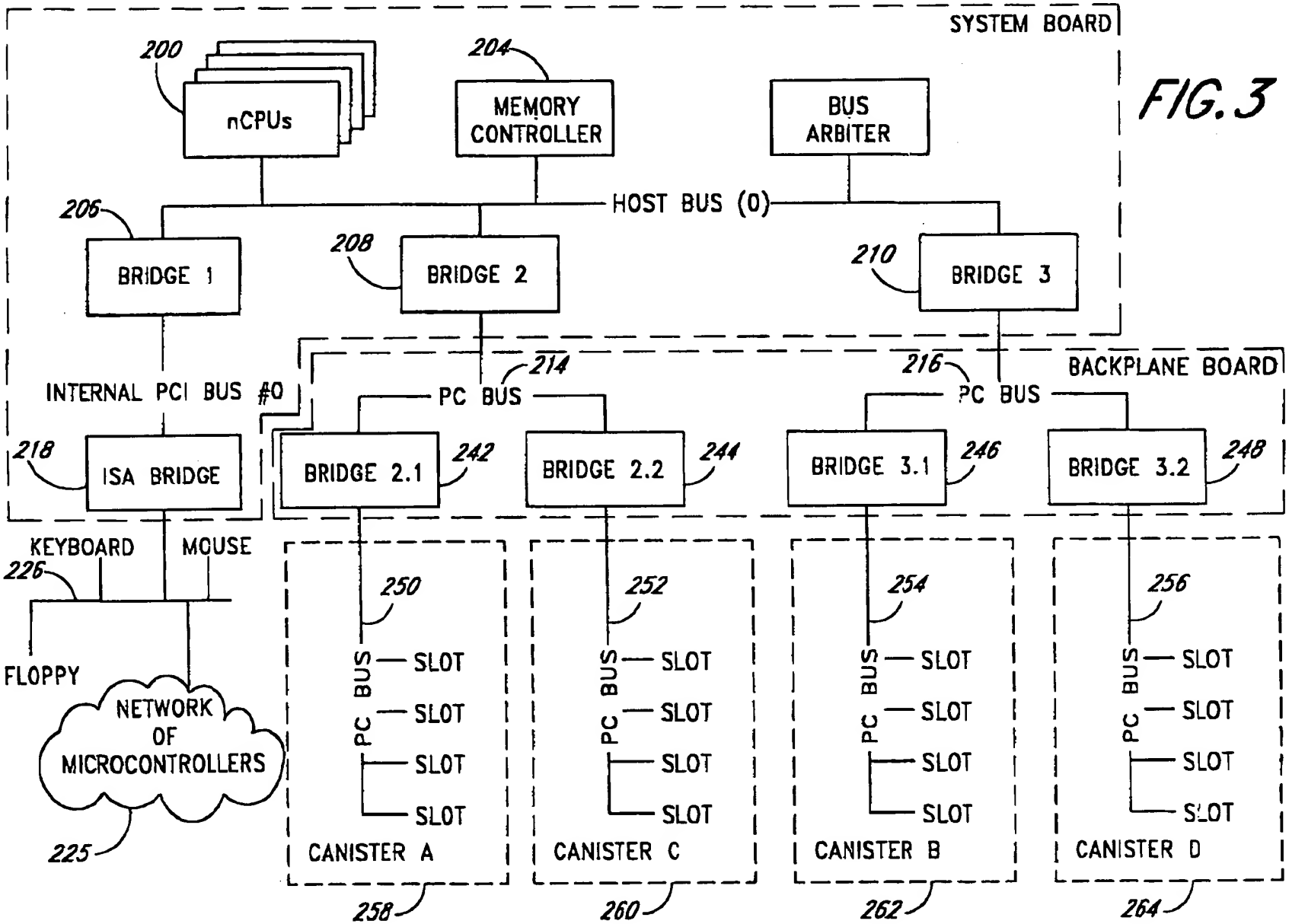
SYSTEM BOARD
200
nCPUs
204
MEMORY CONTROLLER
BUS ARBITER
HOST BUS (0)
206
BRIDGE 1
208
BRIDGE 2
210
BRIDGE 3
BACKPLANE BOARD
INTERNAL PCI BUS #0
214
PC BUS
216
PC BUS
218
ISA BRIDGE
BRIDGE 2.1
242
BRIDGE 2.2
244
BRIDGE 3.1
246
BRIDGE 3.2
248
KEYBOARD
MOUSE
226
FLOPPY
NETWORK OF MICROCONTROLLERS
225
250
PC BUS
SLOT
SLOT
SLOT
SLOT
CANISTER A
258
252
PC BUS
SLOT
SLOT
SLOT
SLOT
CANISTER C
260
254
PC BUS
SLOT
SLOT
SLOT
SLOT
CANISTER B
262
256
PC BUS
SLOT
SLOT
SLOT
SLOT
CANISTER D
264

FIG. 3

26TOOT" 20424680

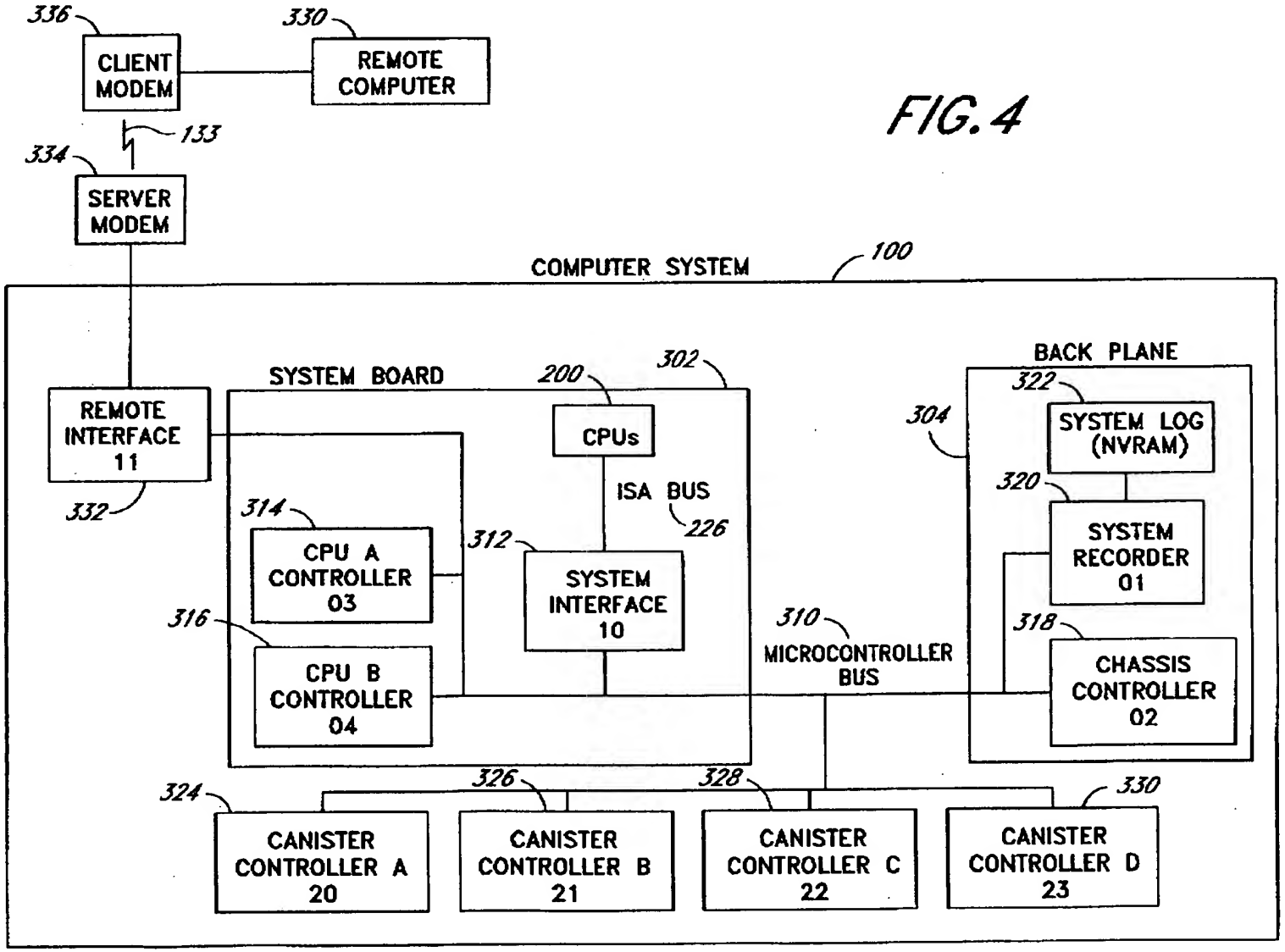

FIG. 4

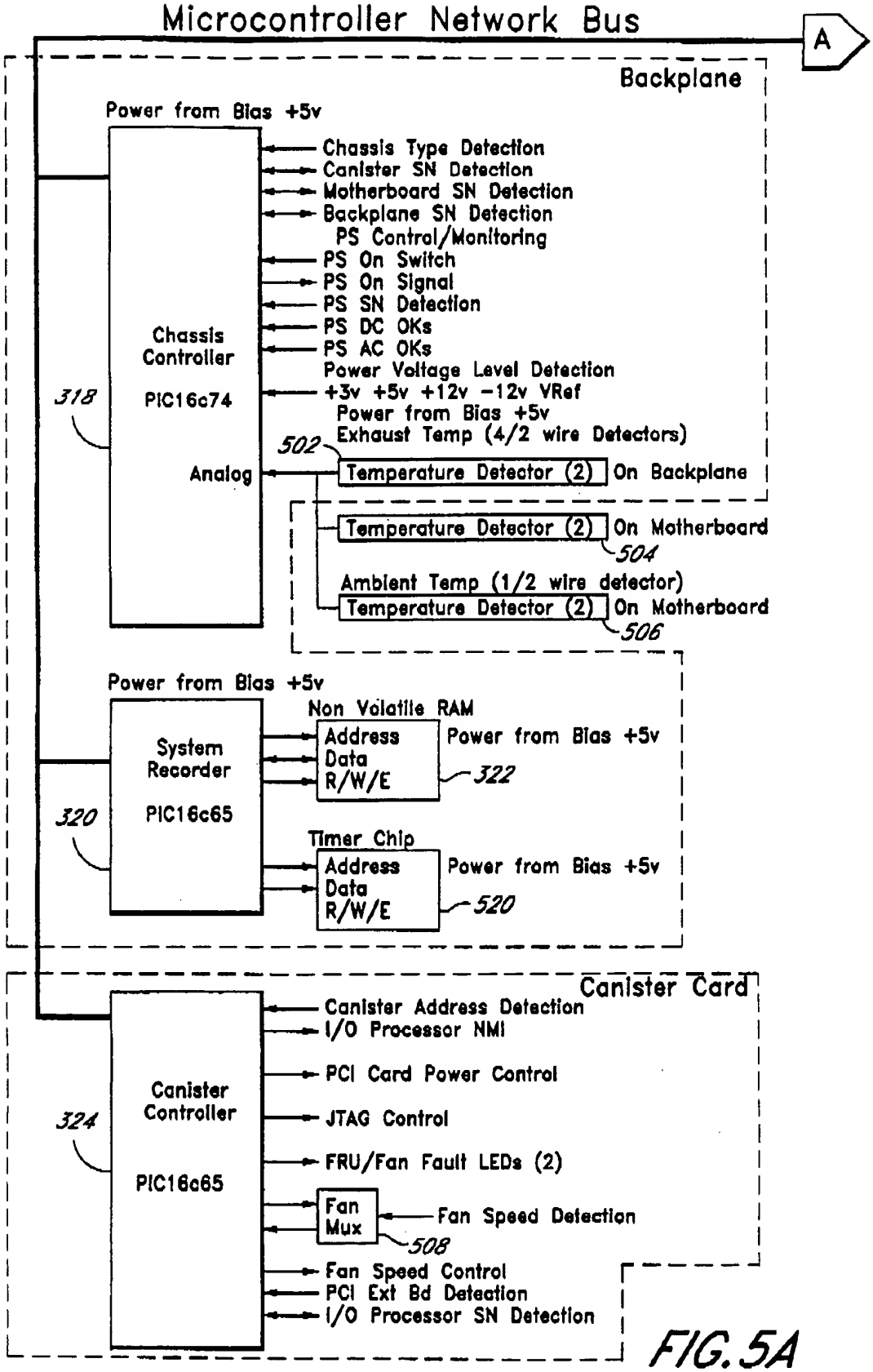
Microcontroller Network Bus
A
Backplane
Power from Bias +5v
Chassis Type Detection
Canister SN Detection
Motherboard SN Detection
Backplane SN Detection
PS Control/Monitoring
PS On Switch
PS On Signal
PS SN Detection
PS DC OKs
PS AC OKs
Power Voltage Level Detection
+3v +5v +12v -12v VRef
Power from Bias +5v
Exhaust Temp (4/2 wire Detectors)
Chassis Controller
PIC16c74
318
Analog
502
Temperature Detector (2) On Backplane
Temperature Detector (2) On Motherboard
504
Ambient Temp (1/2 wire detector)
Temperature Detector (2) On Motherboard
506
Power from Bias +5v
Non Volatile RAM
Address
Data
R/W/E
Power from Bias +5v
322
System Recorder
PIC16c65
320
Timer Chip
Address
Data
R/W/E
Power from Bias +5v
520
Canister Card
Canister Address Detection
I/O Processor NMI
PCI Card Power Control
Canister Controller
PIC16c65
324
JTAG Control
FRU/Fan Fault LEDs (2)
Fan Mux
Fan Speed Detection
508
Fan Speed Control
PCI Ext Bd Detection
I/O Processor SN Detection

FIG. 5A

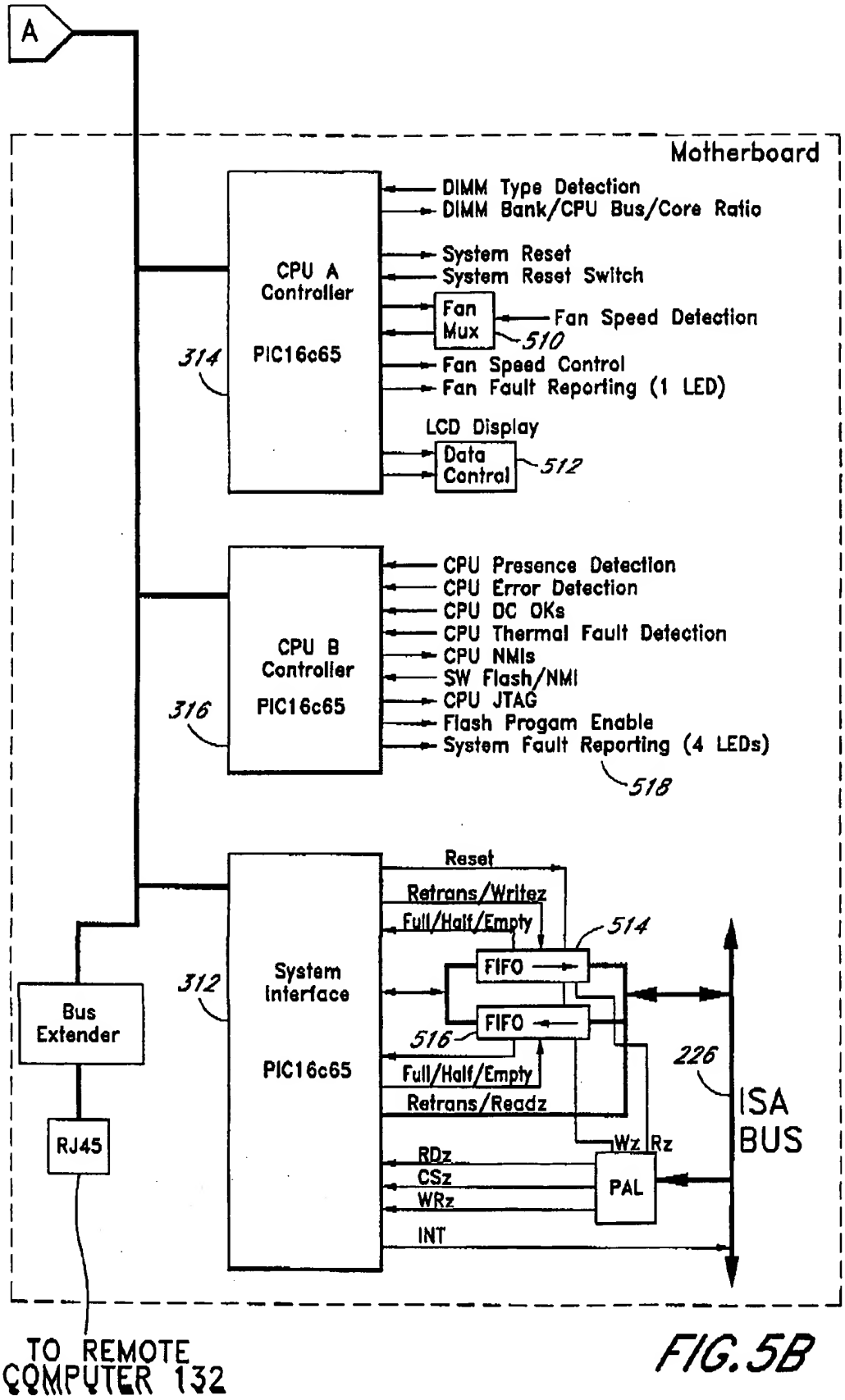
A
Motherboard
CPU A Controller
PIC16c65
314
DIMM Type Detection
DIMM Bank/CPU Bus/Core Ratio
System Reset
System Reset Switch
Fan Mux
510
Fan Speed Detection
Fan Speed Control
Fan Fault Reporting (1 LED)
LCD Display
Data Control
512
CPU B Controller
PIC16c65
316
CPU Presence Detection
CPU Error Detection
CPU DC OKs
CPU Thermal Fault Detection
CPU NMIs
SW Flash/NMI
CPU JTAG
Flash Progam Enable
System Fault Reporting (4 LEDs)
518
System Interface
PIC16c65
312
Reset
Retrans/Writez
Full/Half/Empty
514
FIFO
FIFO
516
Full/Half/Empty
Retrans/Readz
Wz
Rz
RDz
CSz
WRz
PAL
INT
226
ISA BUS
Bus Extender
RJ45
TO REMOTE COMPUTER 132

FIG. 5B

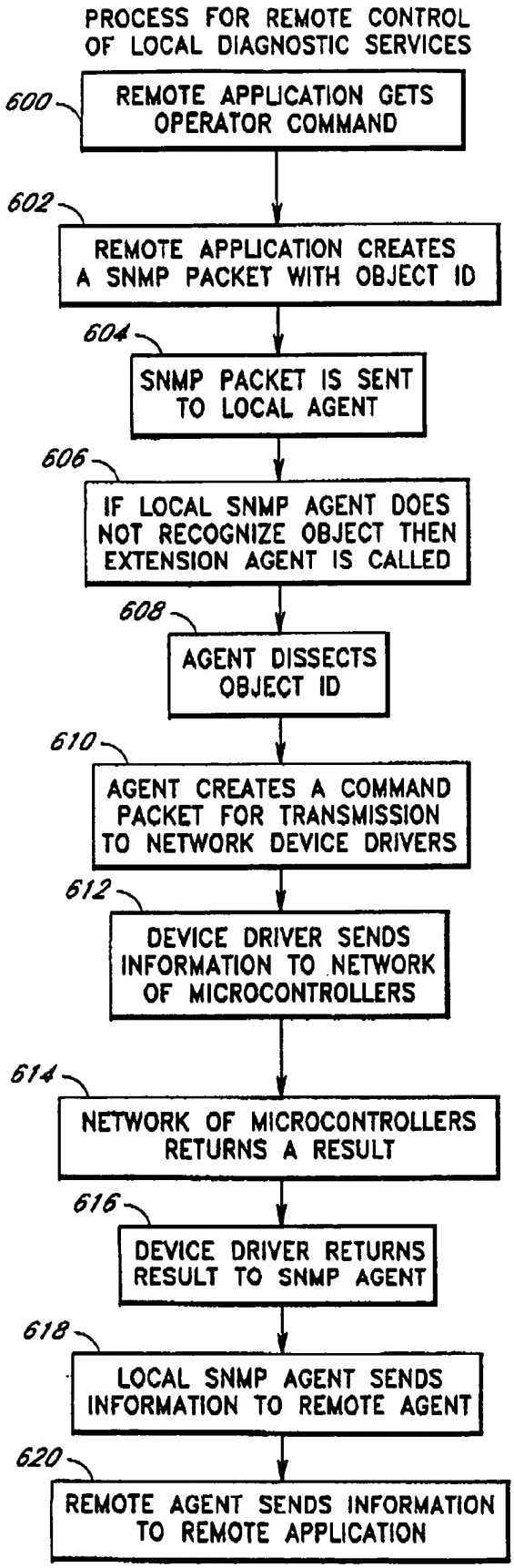
PROCESS FOR REMOTE CONTROL OF LOCAL DIAGNOSTIC SERVICES
600
REMOTE APPLICATION GETS OPERATOR COMMAND
602
REMOTE APPLICATION CREATES A SNMP PACKET WITH OBJECT ID
604
SNMP PACKET IS SENT TO LOCAL AGENT
606
IF LOCAL SNMP AGENT DOES NOT RECOGNIZE OBJECT THEN EXTENSION AGENT IS CALLED
608
AGENT DISSECTS OBJECT ID
610
AGENT CREATES A COMMAND PACKET FOR TRANSMISSION TO NETWORK DEVICE DRIVERS
612
DEVICE DRIVER SENDS INFORMATION TO NETWORK OF MICROCONTROLLERS
614
NETWORK OF MICROCONTROLLERS RETURNS A RESULT
616
DEVICE DRIVER RETURNS RESULT TO SNMP AGENT
618
LOCAL SNMP AGENT SENDS INFORMATION TO REMOTE AGENT
620
REMOTE AGENT SENDS INFORMATION TO REMOTE APPLICATION

FIG. 6

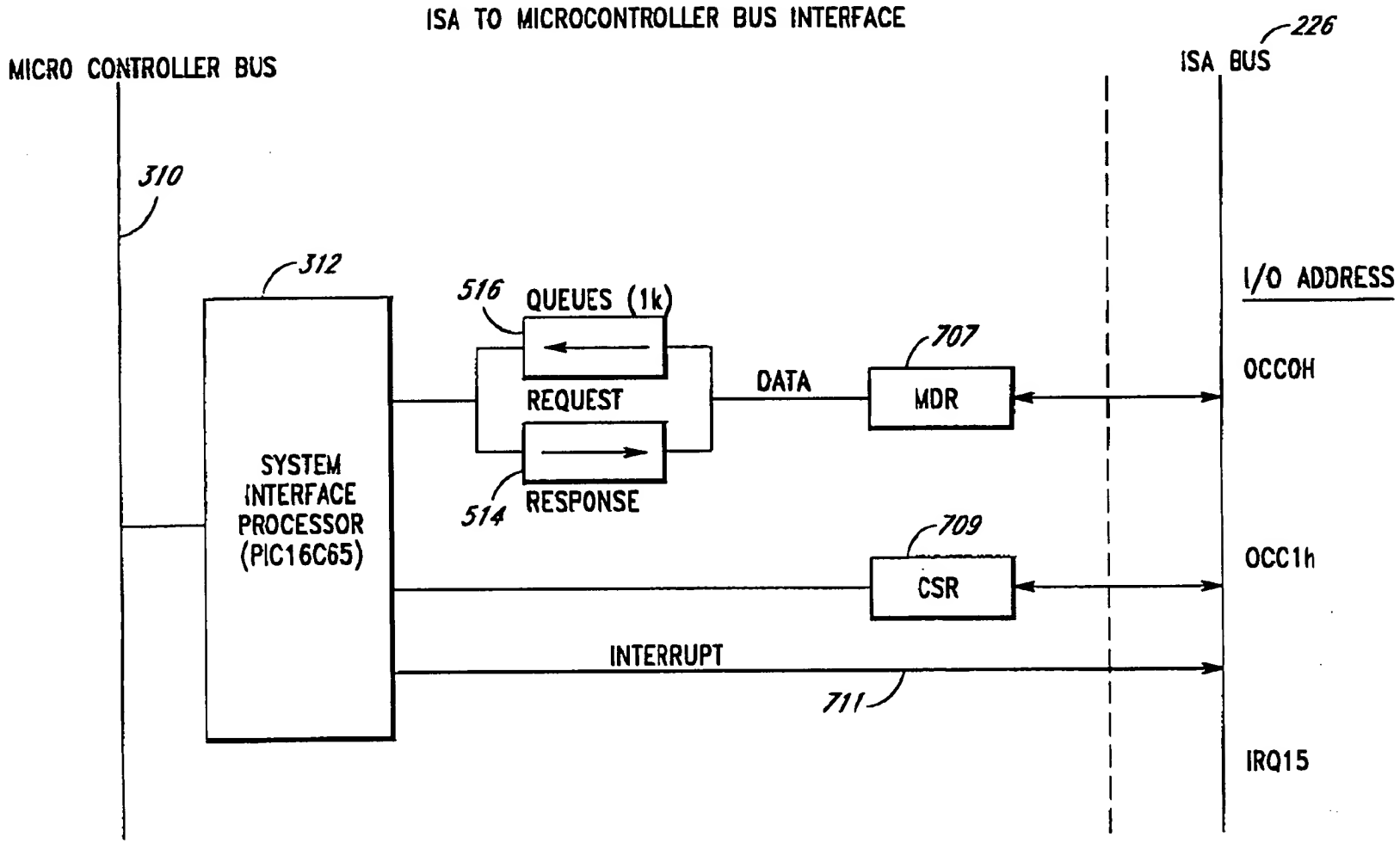

FIG. 7

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MASTER TO SLAVE COMMUNICATION

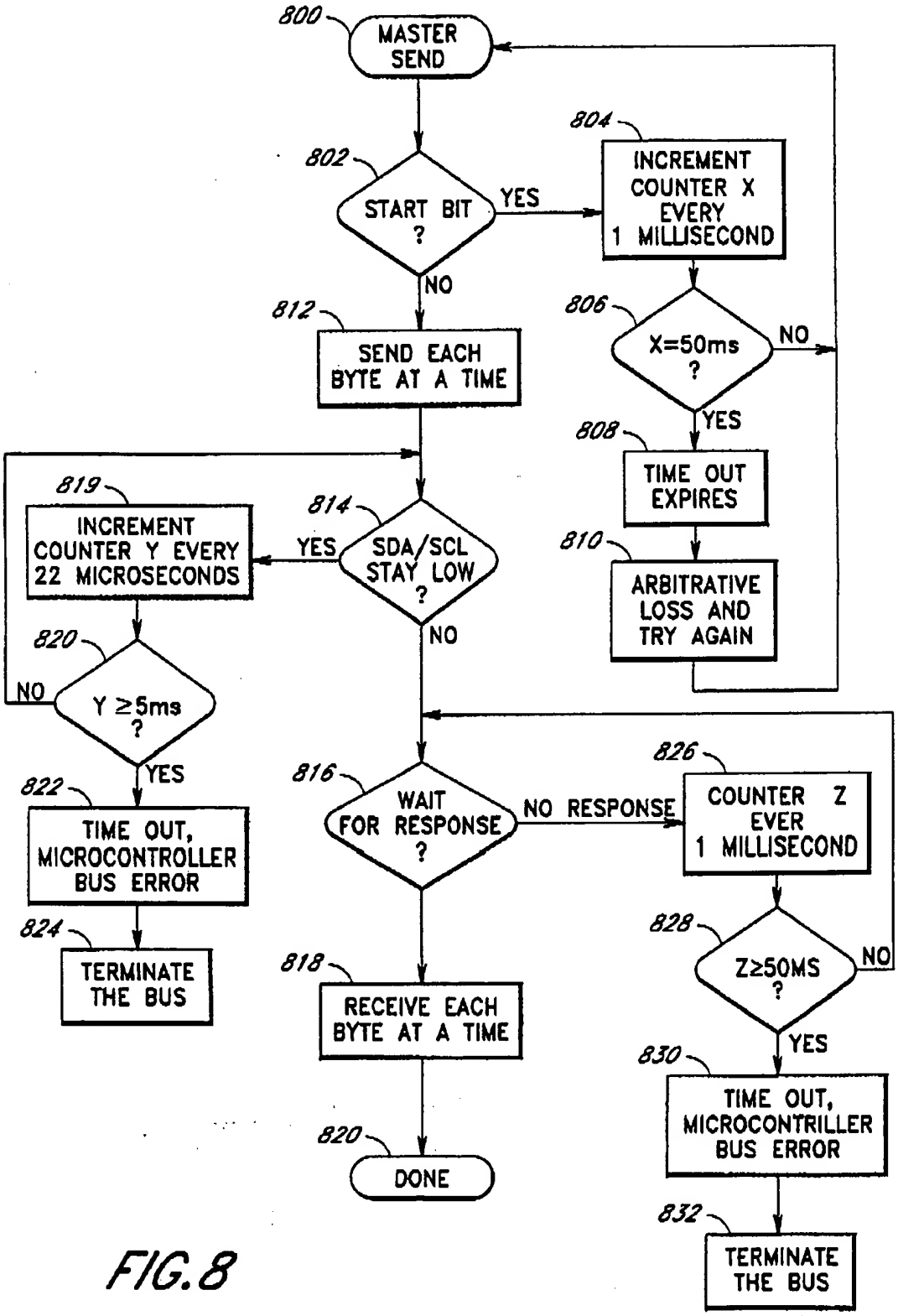

FIG. 8

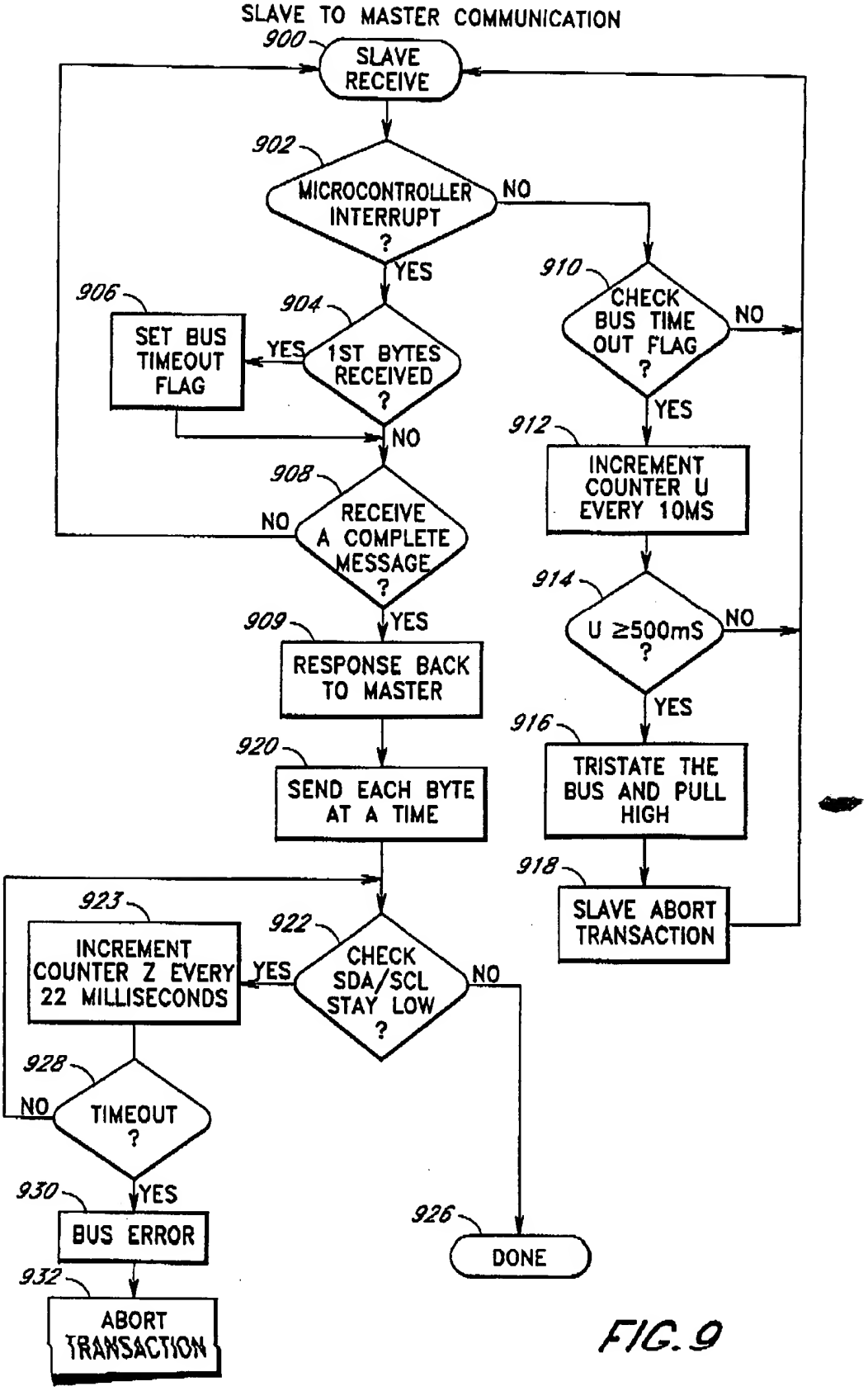
SLAVE TO MASTER COMMUNICATION
900
SLAVE RECEIVE
902
MICROCONTROLLER INTERRUPT ?
NO
YES
904
1ST BYTES RECEIVED ?
YES
906
SET BUS TIMEOUT FLAG
NO
908
RECEIVE A COMPLETE MESSAGE ?
NO
YES
909
RESPONSE BACK TO MASTER
920
SEND EACH BYTE AT A TIME
910
CHECK BUS TIME OUT FLAG ?
NO
YES
912
INCREMENT COUNTER U EVERY 10MS
914
U ≥500mS ?
NO
YES
916
TRISTATE THE BUS AND PULL HIGH
918
SLAVE ABORT TRANSACTION
922
CHECK SDA/SCL STAY LOW ?
YES
NO
923
INCREMENT COUNTER Z EVERY 22 MILLISECONDS
928
TIMEOUT ?
NO
YES
930
BUS ERROR
932
ABORT TRANSACTION
926
DONE

FIG. 9

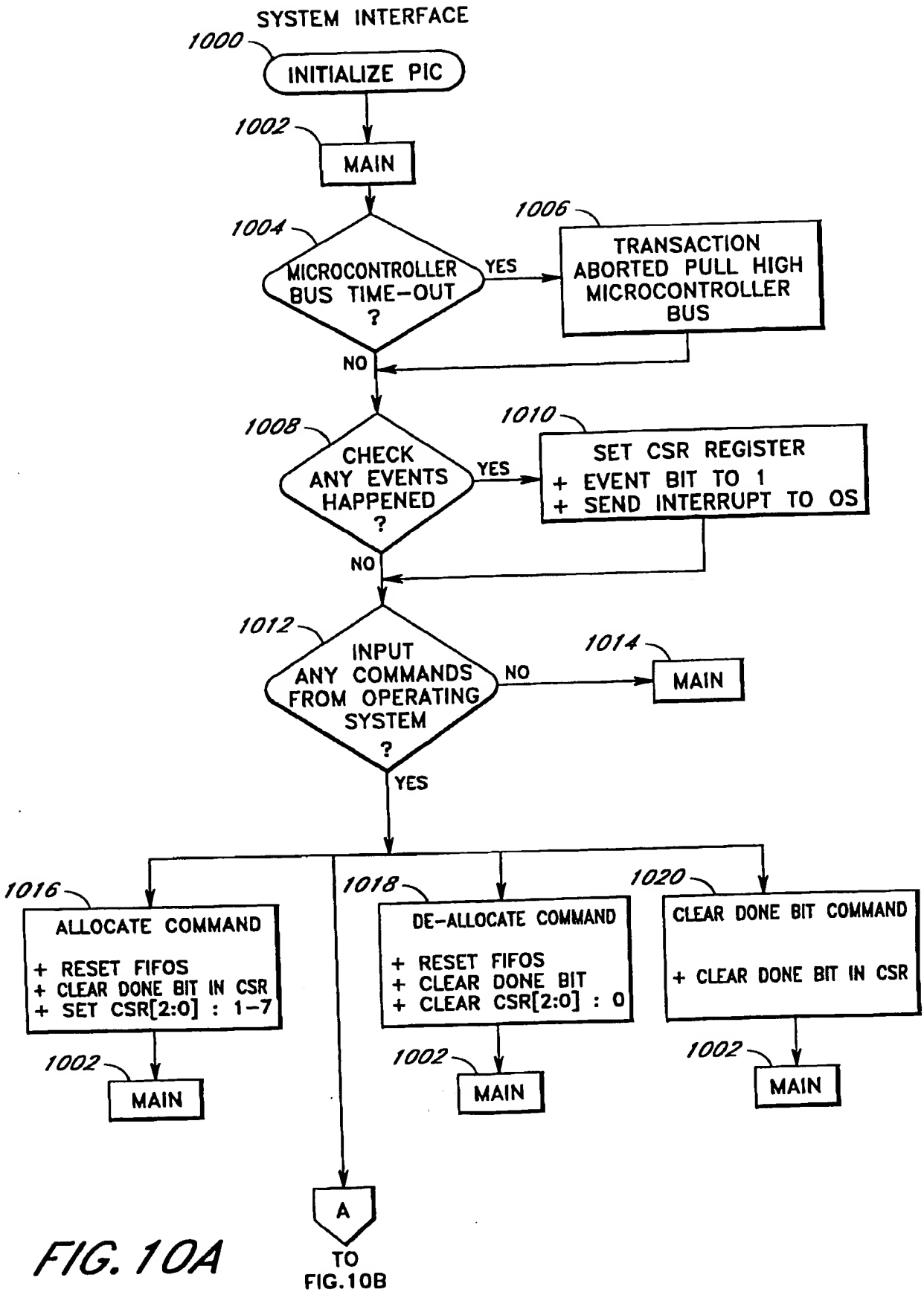
SYSTEM INTERFACE
1000
INITIALIZE PIC
1002
MAIN
1004
MICROCONTROLLER BUS TIME-OUT ?
YES
1006
TRANSACTION ABORTED PULL HIGH MICROCONTROLLER BUS
NO
1008
CHECK ANY EVENTS HAPPENED ?
YES
1010
SET CSR REGISTER
+ EVENT BIT TO 1
+ SEND INTERRUPT TO OS
NO
1012
INPUT ANY COMMANDS FROM OPERATING SYSTEM ?
NO
1014
MAIN
YES
1016
ALLOCATE COMMAND
+ RESET FIFOS
+ CLEAR DONE BIT IN CSR
+ SET CSR[2:0] : 1-7
1002
MAIN
1018
DE-ALLOCATE COMMAND
+ RESET FIFOS
+ CLEAR DONE BIT
+ CLEAR CSR[2:0] : 0
1002
MAIN
1020
CLEAR DONE BIT COMMAND
+ CLEAR DONE BIT IN CSR
1002
MAIN
A
TO FIG.10B

FIG. 10A

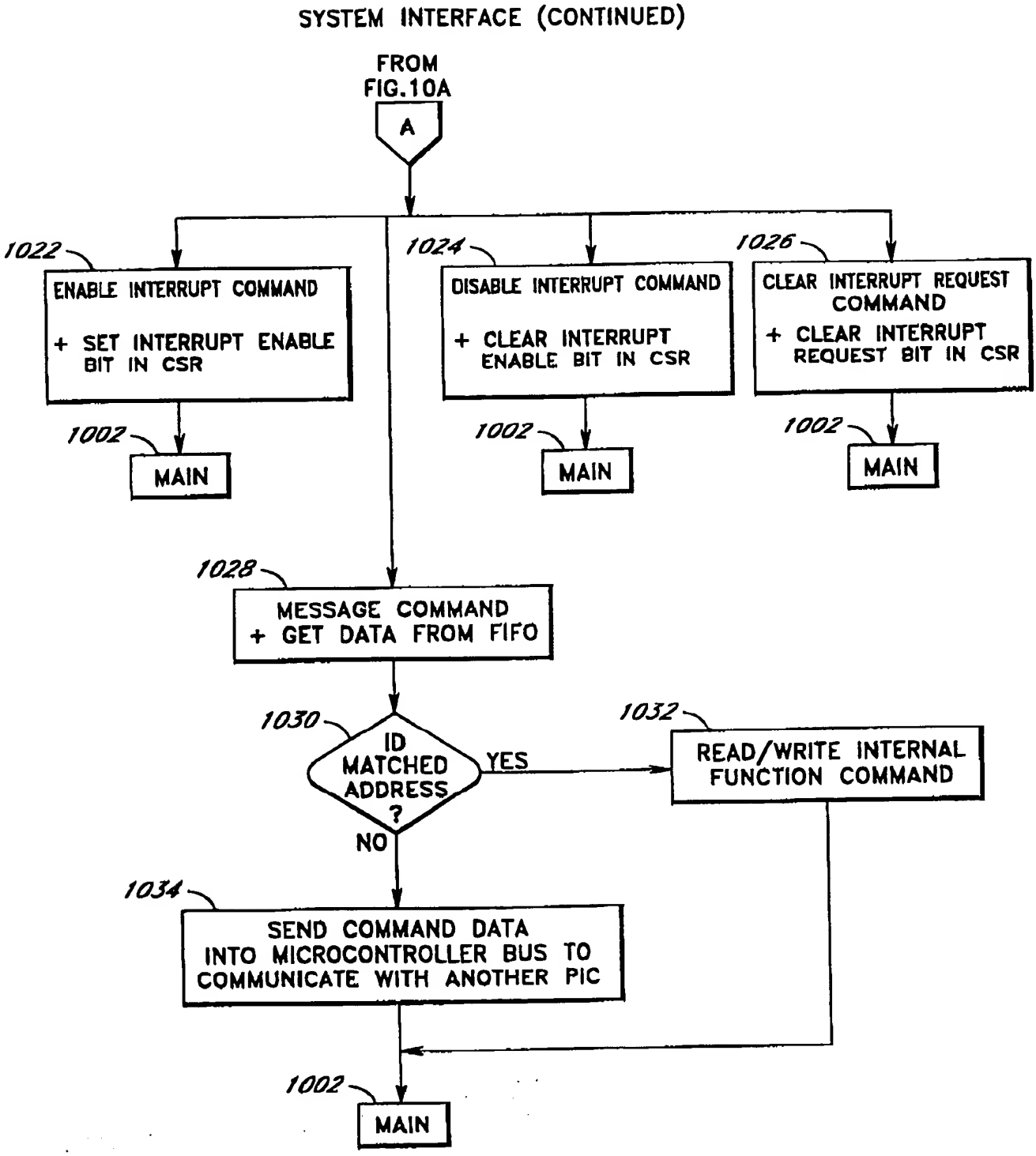
SYSTEM INTERFACE (CONTINUED)
FROM FIG.10A
A
1022
ENABLE INTERRUPT COMMAND
+ SET INTERRUPT ENABLE BIT IN CSR
1002
MAIN
1024
DISABLE INTERRUPT COMMAND
+ CLEAR INTERRUPT ENABLE BIT IN CSR
1002
MAIN
1026
CLEAR INTERRUPT REQUEST COMMAND
+ CLEAR INTERRUPT REQUEST BIT IN CSR
1002
MAIN
1028
MESSAGE COMMAND
+ GET DATA FROM FIFO
1030
ID MATCHED ADDRESS ?
YES
NO
1032
READ/WRITE INTERNAL FUNCTION COMMAND
1034
SEND COMMAND DATA INTO MICROCONTROLLER BUS TO COMMUNICATE WITH ANOTHER PIC
1002
MAIN

FIG. 10B

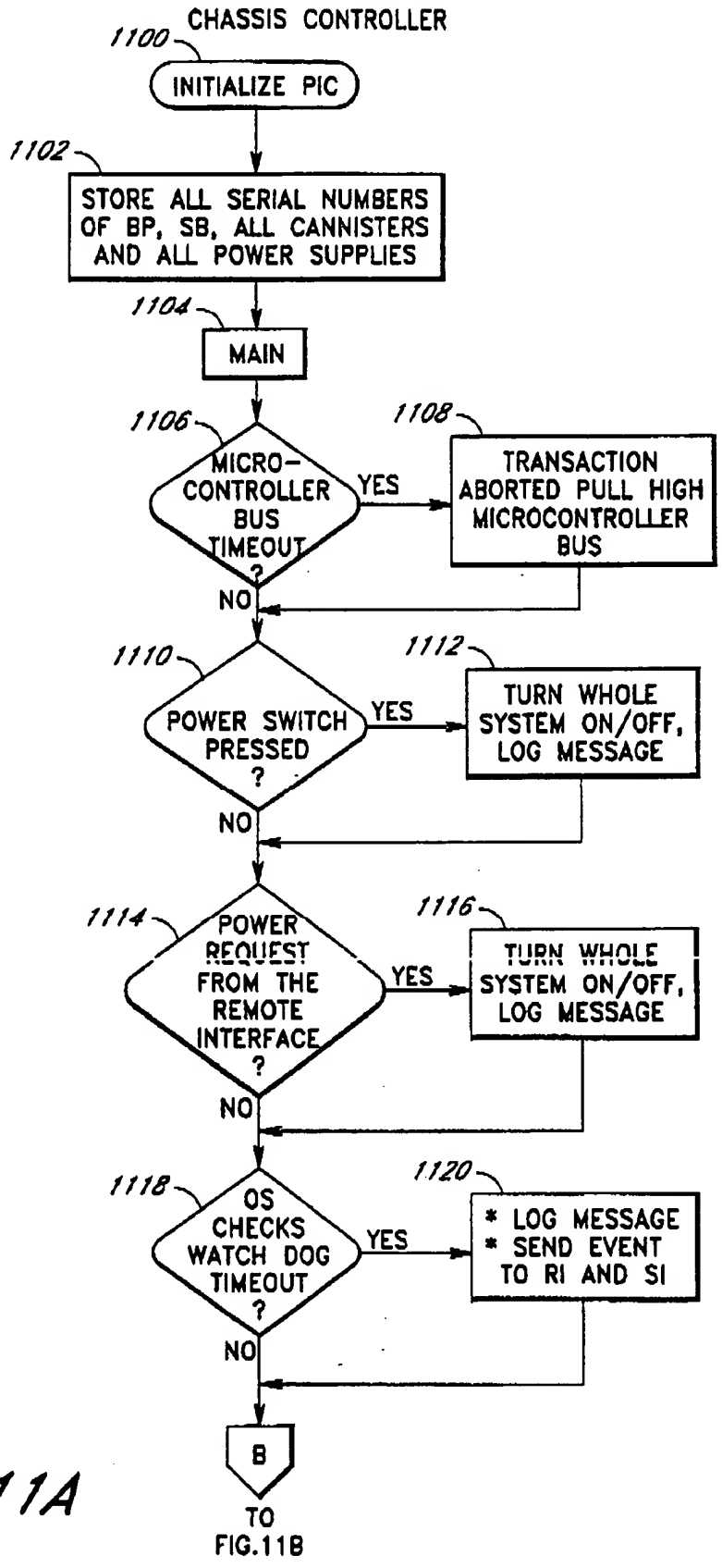
CHASSIS CONTROLLER
1100
INITIALIZE PIC
1102
STORE ALL SERIAL NUMBERS OF BP, SB, ALL CANNISTERS AND ALL POWER SUPPLIES
1104
MAIN
1106
MICRO-CONTROLLER BUS TIMEOUT ?
YES
1108
TRANSACTION ABORTED PULL HIGH MICROCONTROLLER BUS
NO
1110
POWER SWITCH PRESSED ?
YES
1112
TURN WHOLE SYSTEM ON/OFF, LOG MESSAGE
NO
1114
POWER REQUEST FROM THE REMOTE INTERFACE ?
YES
1116
TURN WHOLE SYSTEM ON/OFF, LOG MESSAGE
NO
1118
OS CHECKS WATCH DOG TIMEOUT ?
YES
1120
* LOG MESSAGE
* SEND EVENT TO RI AND SI
NO
B
TO FIG.11B

FIG. 11A

CHASSIS CONTROLLER (CONTINUED)

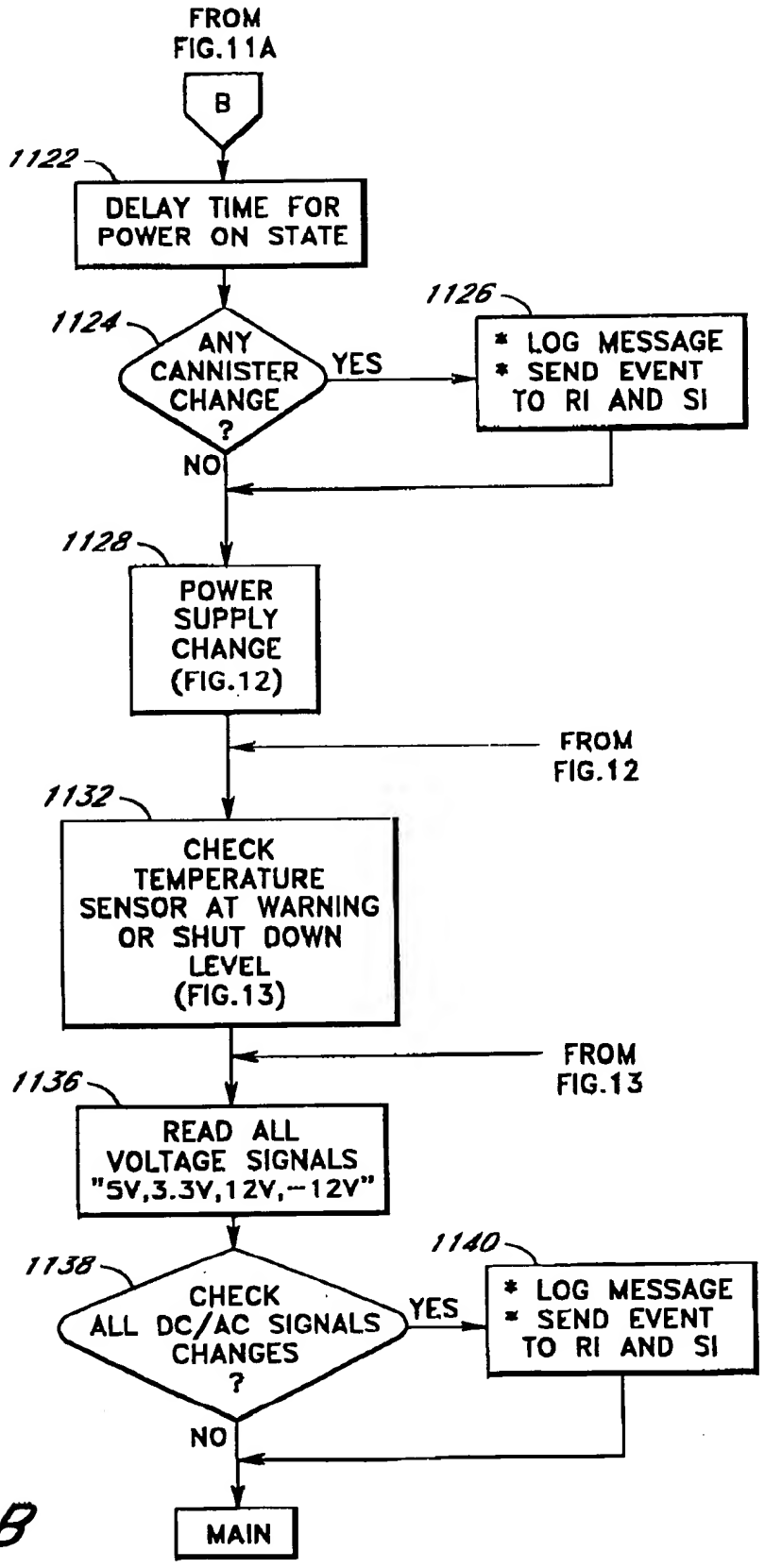

FIG. 11B

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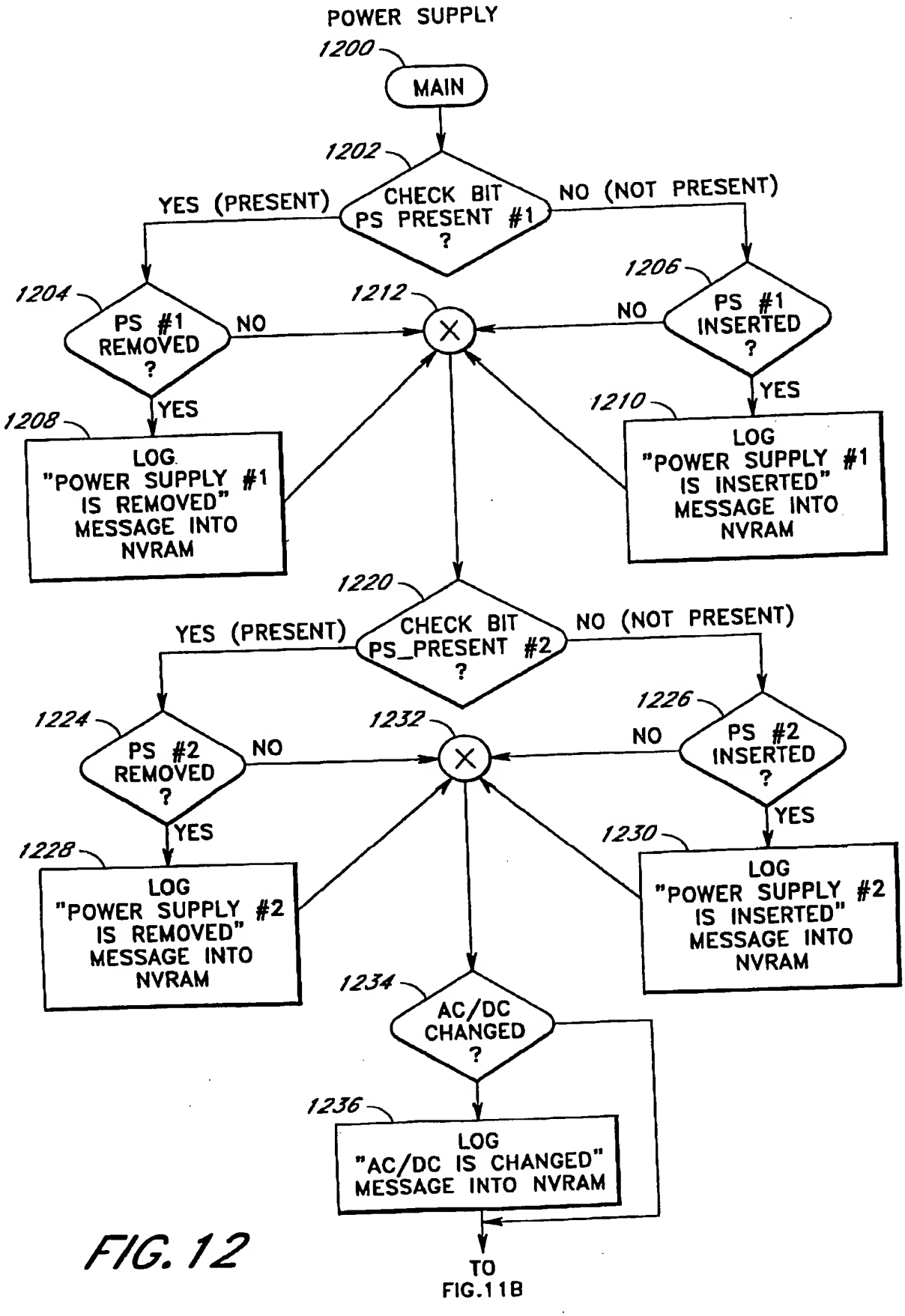
POWER SUPPLY
1200
MAIN
1202
CHECK BIT PS PRESENT #1 ?
YES (PRESENT)
NO (NOT PRESENT)
1204
PS #1 REMOVED ?
NO
YES
1206
PS #1 INSERTED ?
NO
YES
1208
LOG "POWER SUPPLY #1 IS REMOVED" MESSAGE INTO NVRAM
1210
LOG "POWER SUPPLY #1 IS INSERTED" MESSAGE INTO NVRAM
1212
1220
CHECK BIT PS_PRESENT #2 ?
YES (PRESENT)
NO (NOT PRESENT)
1224
PS #2 REMOVED ?
NO
YES
1226
PS #2 INSERTED ?
NO
YES
1228
LOG "POWER SUPPLY #2 IS REMOVED" MESSAGE INTO NVRAM
1230
LOG "POWER SUPPLY #2 IS INSERTED" MESSAGE INTO NVRAM
1232
1234
AC/DC CHANGED ?
1236
LOG "AC/DC IS CHANGED" MESSAGE INTO NVRAM
TO FIG.11B

FIG. 12

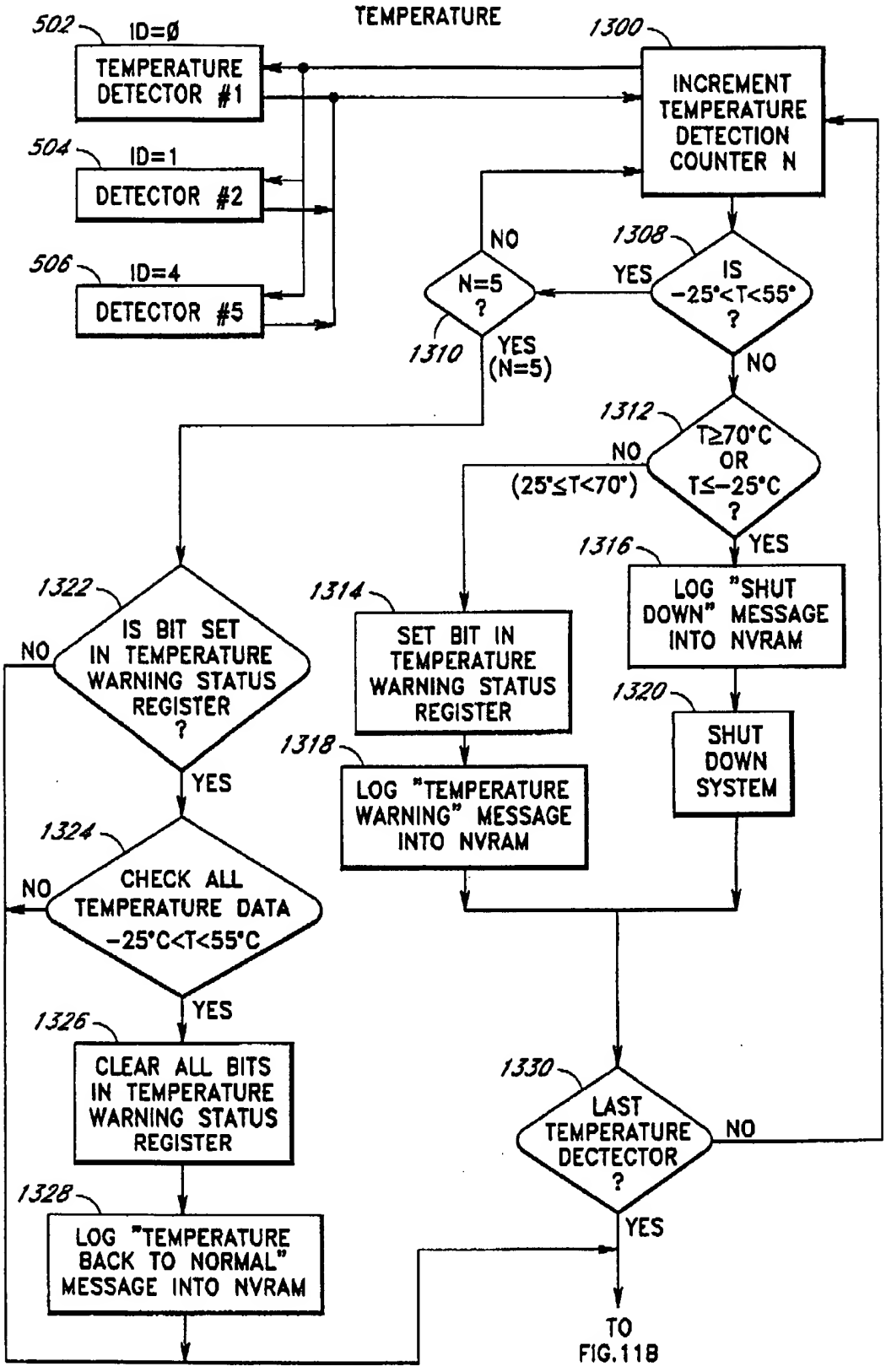
TEMPERATURE
502
ID=Ø
TEMPERATURE DETECTOR #1
504
ID=1
DETECTOR #2
506
ID=4
DETECTOR #5
1300
INCREMENT TEMPERATURE DETECTION COUNTER N
1308
IS -25°<T<55° ?
YES
NO
N=5 ?
1310
YES (N=5)
NO
1312
T≥70°C OR T≤-25°C ?
NO (25°≤T<70°)
YES
1316
LOG "SHUT DOWN" MESSAGE INTO NVRAM
1320
SHUT DOWN SYSTEM
1314
SET BIT IN TEMPERATURE WARNING STATUS REGISTER
1318
LOG "TEMPERATURE WARNING" MESSAGE INTO NVRAM
1322
IS BIT SET IN TEMPERATURE WARNING STATUS REGISTER ?
NO
YES
1324
CHECK ALL TEMPERATURE DATA -25°C<T<55°C
NO
YES
1326
CLEAR ALL BITS IN TEMPERATURE WARNING STATUS REGISTER
1328
LOG "TEMPERATURE BACK TO NORMAL" MESSAGE INTO NVRAM
1330
LAST TEMPERATURE DECTECTOR ?
NO
YES
TO FIG.11B

FIG. 13

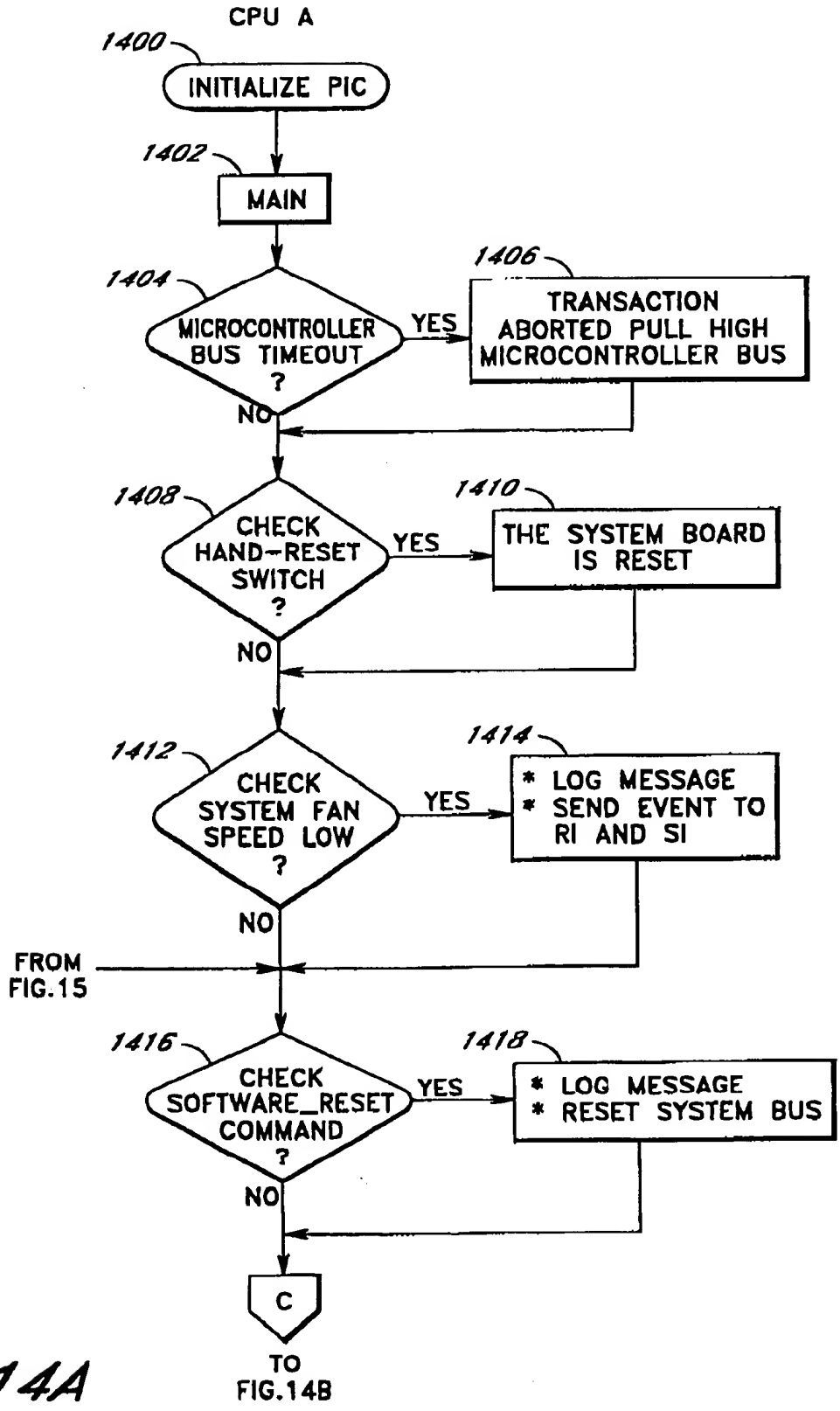
CPU A
1400
INITIALIZE PIC
1402
MAIN
1404
MICROCONTROLLER BUS TIMEOUT ?
YES
1406
TRANSACTION ABORTED PULL HIGH MICROCONTROLLER BUS
NO
1408
CHECK HAND-RESET SWITCH ?
YES
1410
THE SYSTEM BOARD IS RESET
NO
1412
CHECK SYSTEM FAN SPEED LOW ?
YES
1414
* LOG MESSAGE
* SEND EVENT TO RI AND SI
NO
FROM FIG.15
1416
CHECK SOFTWARE_RESET COMMAND ?
YES
1418
* LOG MESSAGE
* RESET SYSTEM BUS
NO
C
TO FIG.14B

FIG. 14A

CPU A (CONTINUED)

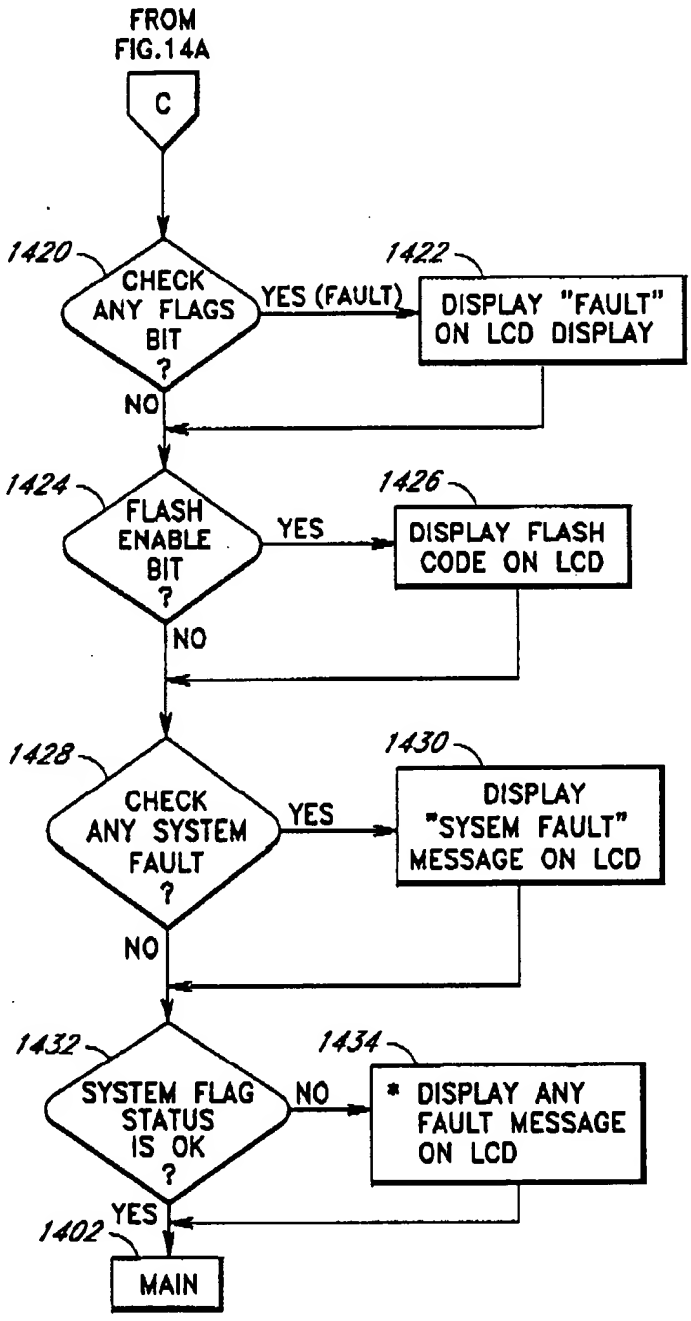

FIG. 14B

5,934,202 - 1999

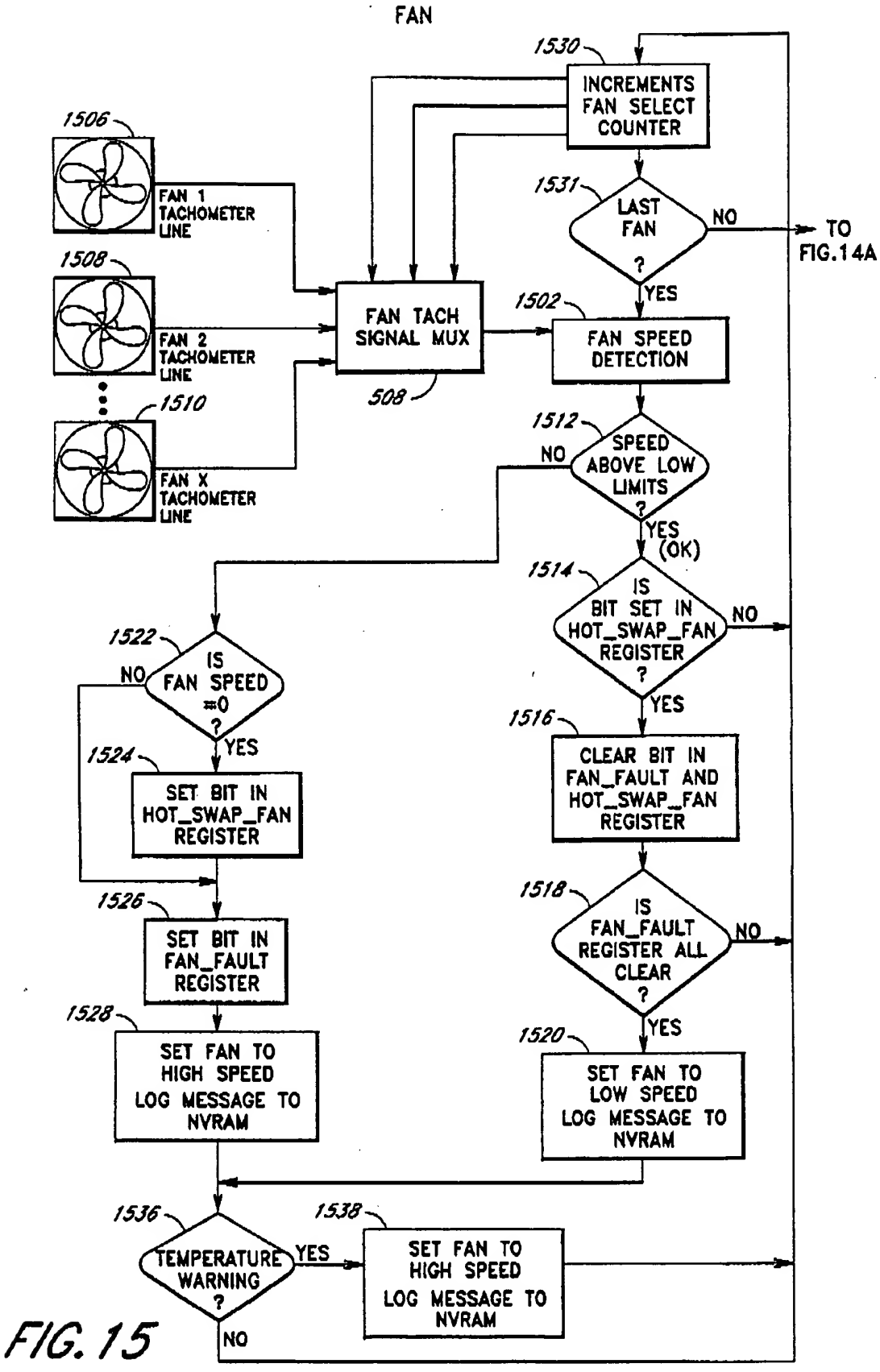
FAN
1530
INCREMENTS FAN SELECT COUNTER
1506
FAN 1 TACHOMETER LINE
1508
FAN 2 TACHOMETER LINE
1510
FAN X TACHOMETER LINE
FAN TACH SIGNAL MUX
508
1531
LAST FAN ?
NO
TO FIG.14A
YES
1502
FAN SPEED DETECTION
1512
SPEED ABOVE LOW LIMITS ?
NO
YES (OK)
1514
IS BIT SET IN HOT_SWAP_FAN REGISTER ?
NO
YES
1516
CLEAR BIT IN FAN_FAULT AND HOT_SWAP_FAN REGISTER
1518
IS FAN_FAULT REGISTER ALL CLEAR ?
NO
YES
1520
SET FAN TO LOW SPEED LOG MESSAGE TO NVRAM
1522
IS FAN SPEED =0 ?
NO
YES
1524
SET BIT IN HOT_SWAP_FAN REGISTER
1526
SET BIT IN FAN_FAULT REGISTER
1528
SET FAN TO HIGH SPEED LOG MESSAGE TO NVRAM
1536
TEMPERATURE WARNING ?
YES
NO
1538
SET FAN TO HIGH SPEED LOG MESSAGE TO NVRAM

FIG. 15

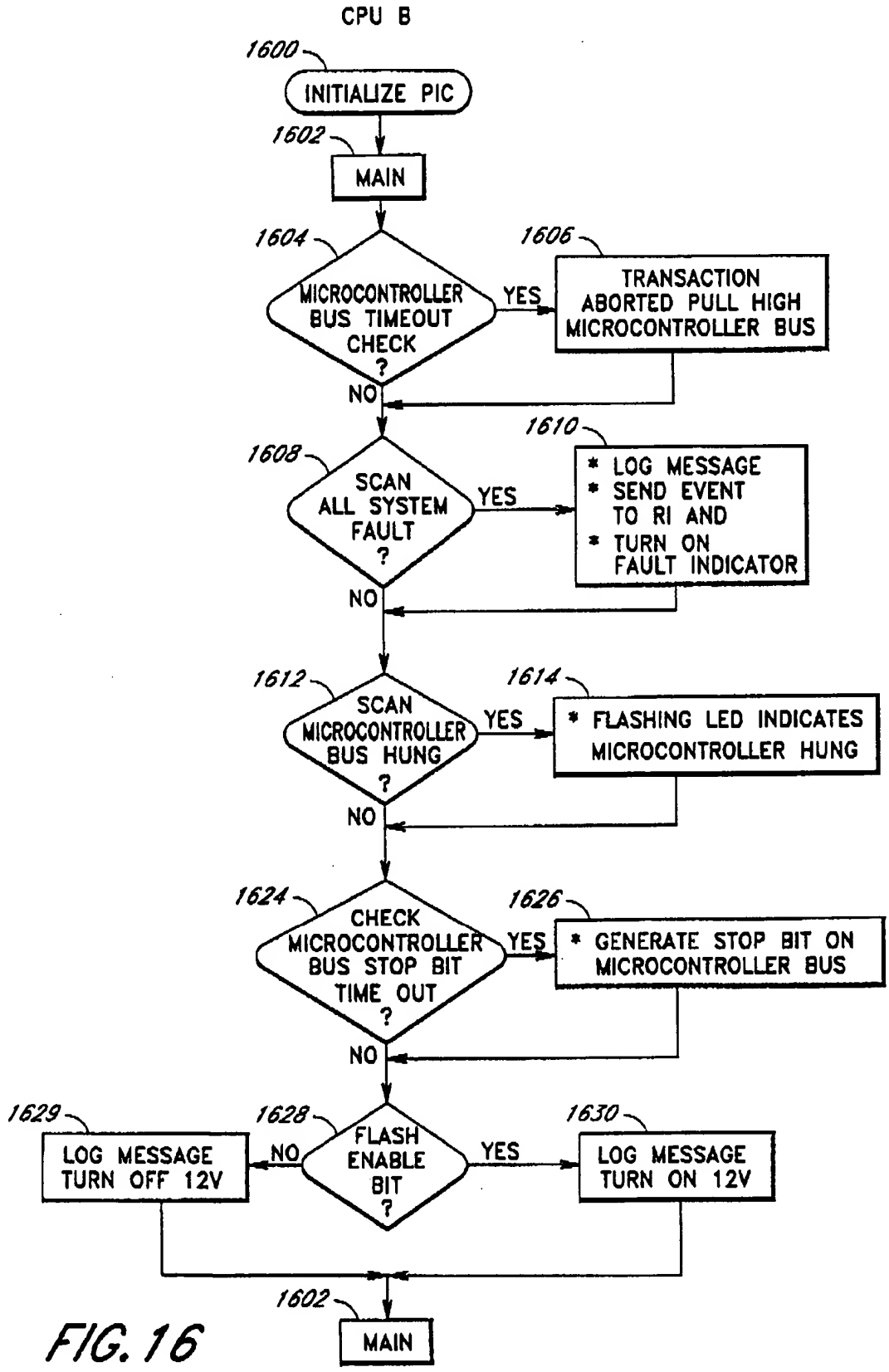
CPU B
1600
INITIALIZE PIC
1602
MAIN
1604
MICROCONTROLLER BUS TIMEOUT CHECK ?
YES
1606
TRANSACTION ABORTED PULL HIGH MICROCONTROLLER BUS
NO
1608
SCAN ALL SYSTEM FAULT ?
YES
1610
* LOG MESSAGE
* SEND EVENT TO RI AND
* TURN ON FAULT INDICATOR
NO
1612
SCAN MICROCONTROLLER BUS HUNG ?
YES
1614
* FLASHING LED INDICATES MICROCONTROLLER HUNG
NO
1624
CHECK MICROCONTROLLER BUS STOP BIT TIME OUT ?
YES
1626
* GENERATE STOP BIT ON MICROCONTROLLER BUS
NO
1629
LOG MESSAGE TURN OFF 12V
NO
1628
FLASH ENABLE BIT ?
YES
1630
LOG MESSAGE TURN ON 12V
1602
MAIN

FIG. 16

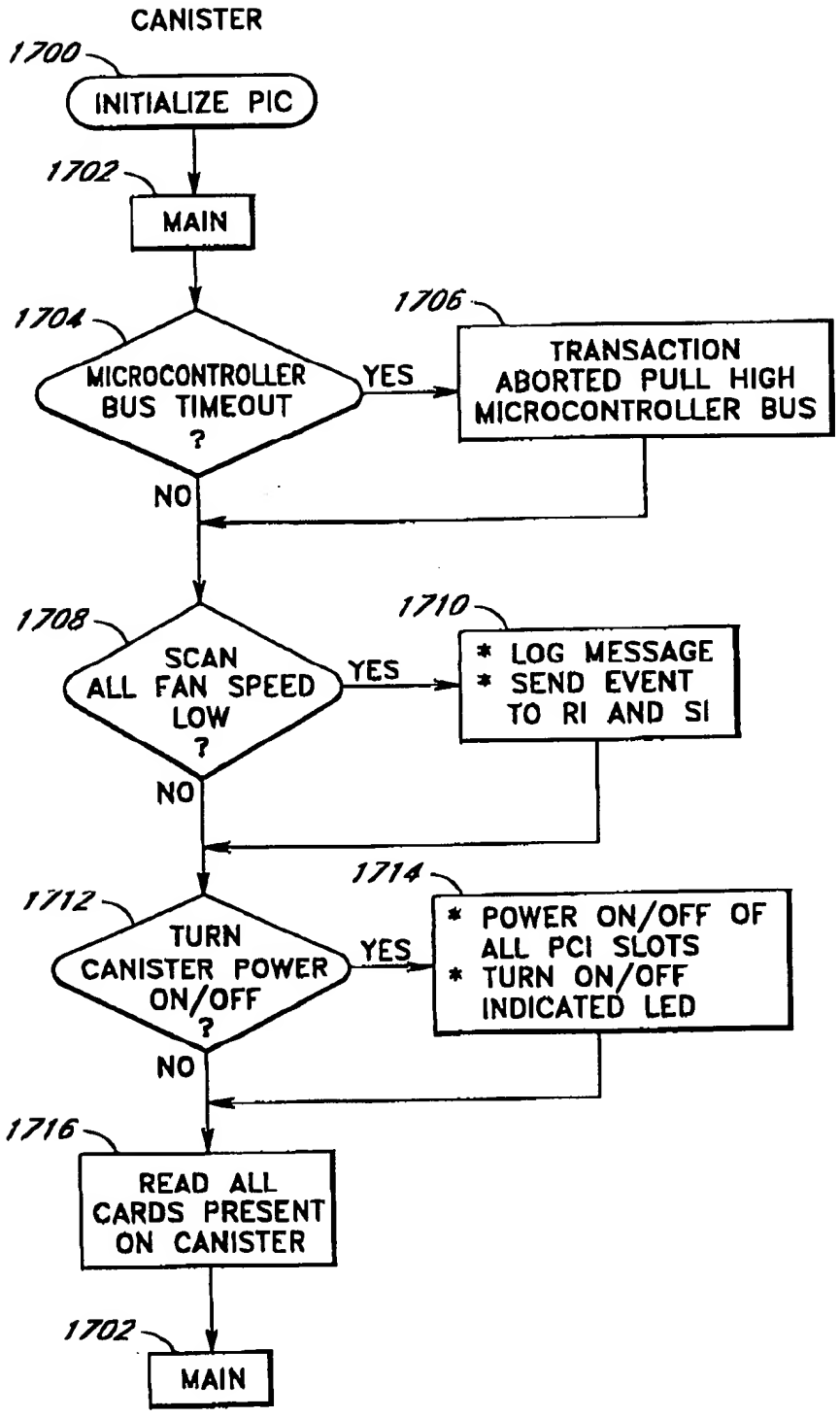
CANISTER
1700
INITIALIZE PIC
1702
MAIN
1704
MICROCONTROLLER BUS TIMEOUT ?
YES
1706
TRANSACTION ABORTED PULL HIGH MICROCONTROLLER BUS
NO
1708
SCAN ALL FAN SPEED LOW ?
YES
1710
* LOG MESSAGE
* SEND EVENT TO RI AND SI
NO
1712
TURN CANISTER POWER ON/OFF ?
YES
1714
* POWER ON/OFF OF ALL PCI SLOTS
* TURN ON/OFF INDICATED LED
NO
1716
READ ALL CARDS PRESENT ON CANISTER
1702
MAIN

FIG. 17

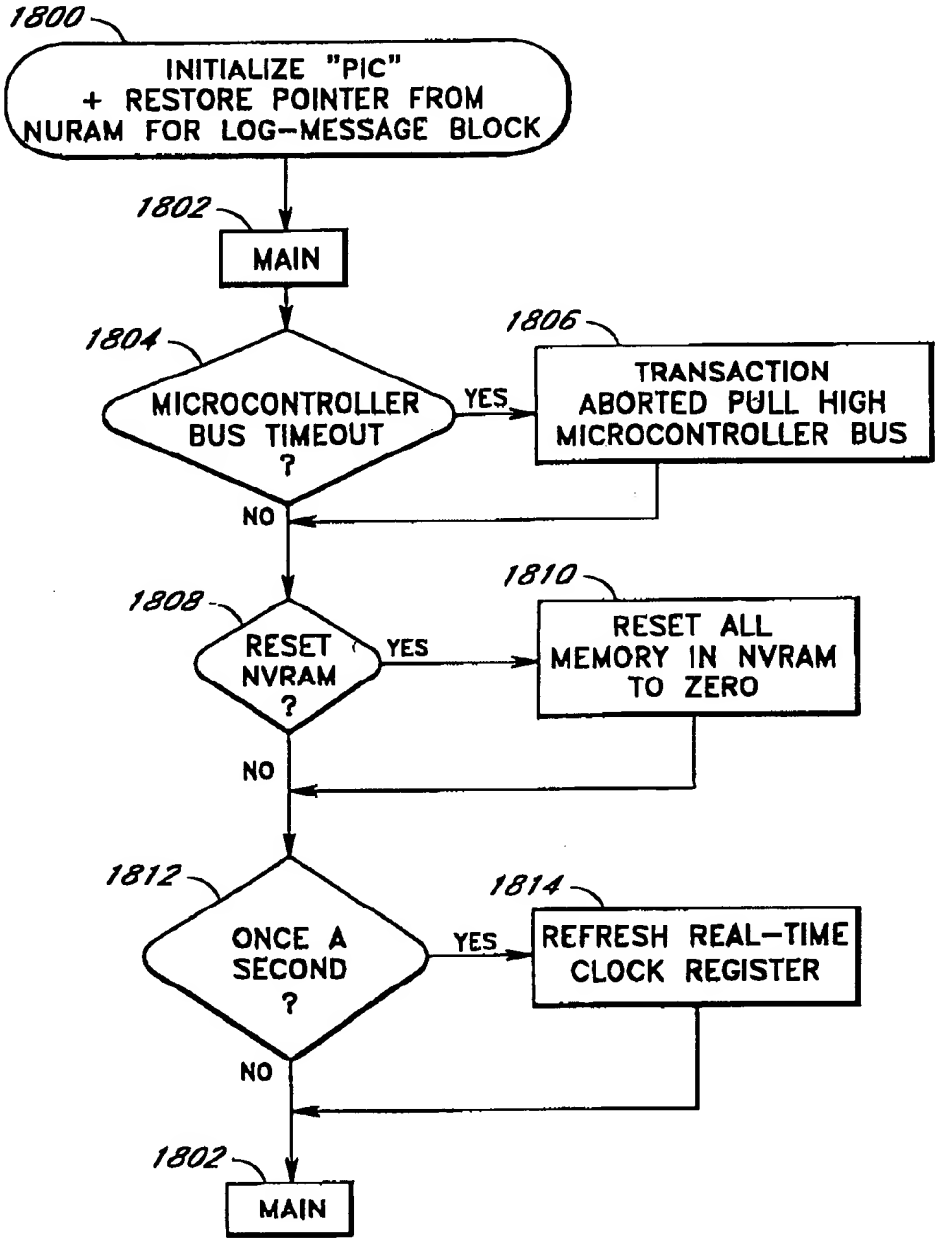

FIG. 18

Serial No. 08/474,963